

Functioning Test of an Advanced Crystallisation Process (ACP) Unit

Summary Report

1. An ACP unit (as supplied) was connected to a domestic quality water supply at the University of Surrey, Guildford. The unit was conditioned by allowing water to run through it for 48 hours before a sample of 20 litres was taken for testing.
2. A 3000W domestic immersion heater element was placed in the 20L sample of treated water and utilised so as to maintain a water temperature of 75°C for 6 continuous hours to simulate a domestic hot water tank environment.
3. Resultant scale (calcium carbonate – CaCO₃) was dissolved from the heater element with 50mL of 0.5M nitric acid (HNO₃). This solution was then analysed by ICP-MS to determine calcium content.
4. A similar 20L sample of untreated water was treated and analysed in the same way (using a second immersion heater element) to provide a comparison.
5. The instrument used for analysis was an Agilent Technologies 7700 ICP-MS.
6. Results for total calcium are shown in Table 1.

Sample name	Concentration ⁴⁴ Ca (mg/l)
<i>Detection Limit</i>	<i>0.001</i>
SRM 1640*	5.630 ± 0.024
Control (untreated water)	1481
ACP treated water	271.7

*NIST Standard Reference Material; reference value: 5.516 ± 0.021 mg/l Ca (n=2)

Table 1: Trace metal concentrations

7. Measured calcium can only come from the scale dissolved from the element, therefore it can be seen that treatment with the ACP unit removes >80% of the calcium available to form scale.

If you have any further queries, please do not hesitate to contact us.